



# ***Data Provisioning***

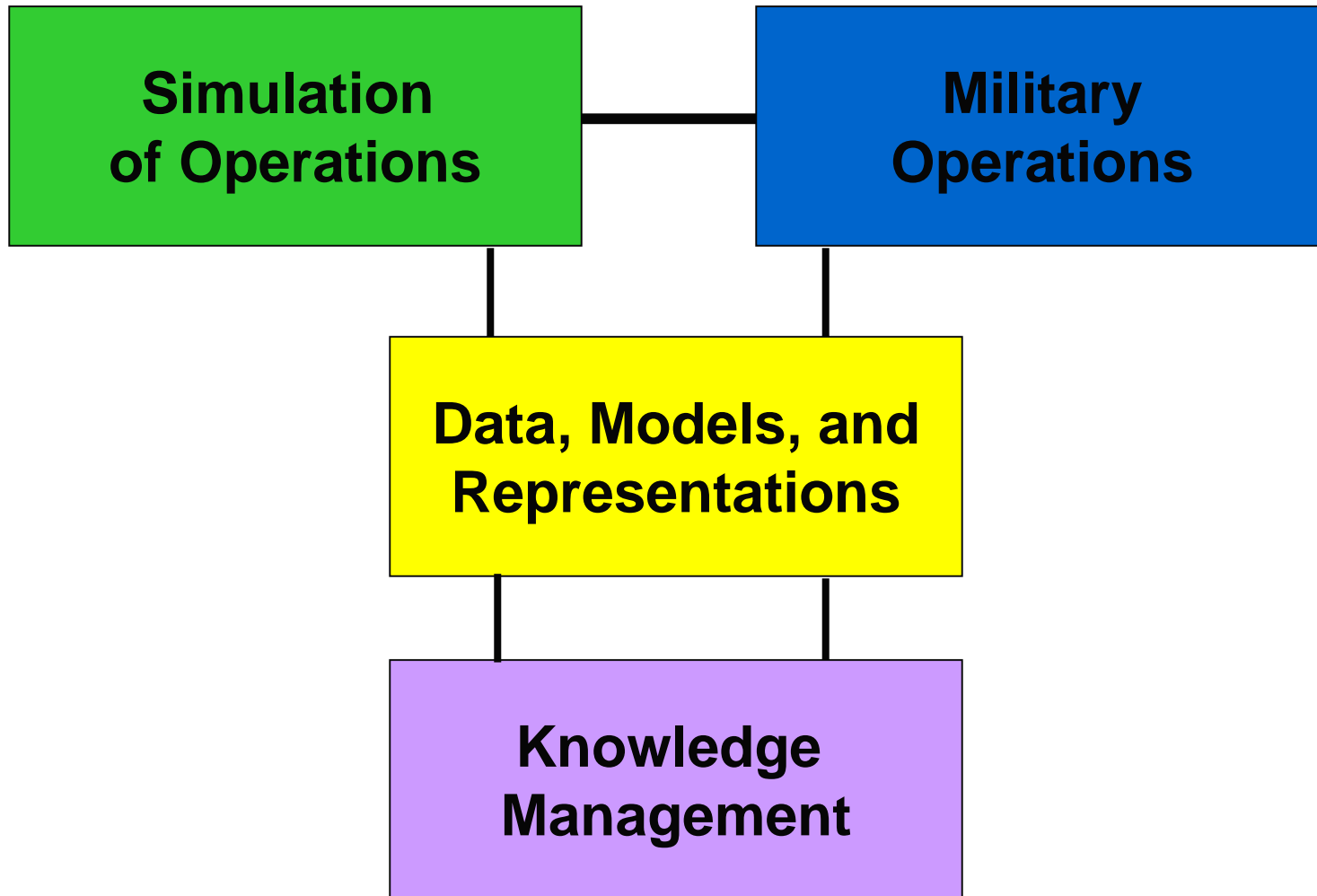
**Jack Sheehan, DMSO Data Engineer  
Defense Modeling & Simulation Office  
jsheehan@dmsomil, 703-998-0660 x448  
sheehan@arlut.utexas.edu, 215-361-2026**

# **Data Provisioning**



- **Introduction**
- **Conceptual Models of the Mission Space**
  - a.) **Warfighter's Perspective**
  - b.) **Platform Analyst's Perspective**
- **Locate Authoritative Data Sources (ADS)**
- **Establish Common Ways to Describe Data**
- **Establish Common Ways to Exchange Data**
- **Develop Tools and Utilities to Access, Exchange Data**
- **Establish Partnerships to Produce, Disseminate Data**
- **Address Key Technical, Process, and Policy Issues**

# **Information-Intensive Warfare, Digitization of the Battle blurs distinctions between simulations and operations**



# Changes in Mission, Changes in Measures?



Ablaze, the Arizona slips beneath the water



Measure? Avoidance?



More US Marines won the Medal of Honor on Iwo Jima than in any other battle in US History. In 36 days of fighting there were **25,851 US casualties** (1 in 3 were killed or wounded). Virtually all 22,000 Japanese perished.



~~Loss Exchange Ratio (LER)~~



# **Data Provisioning Problem Summary**

- **A simulation is only as credible as its data**
- **“Overloading” formats with new/alternative content is a common “in-door sport” in modeling and simulation**
- **Substantial investment in legacy systems must be retained**
- **The “quality and utility” of data cannot be separated from the “purpose and intent” of its usage**

## **Key Problems:**

- **Authoritative data is not readily available**
- **Data that is available is incomplete or ambiguous**
- **Valuable data sets are not retained for future use**

# Data Provisioning

- Introduction
- Identify Key Information Classes
  - a.) Warfighter's Perspective
  - b.) Platform Analyst's Perspective
- Locate Authoritative Data Sources (ADS)
- Establish Common Ways to Describe Data
- Establish Common Ways to Exchange Data
- Develop Tools and Utilities to Access, Exchange Data
- Establish Partnerships to Produce, Disseminate Data
- Address Key Technical, Process, and Policy Issues



# **Data Provisioning**

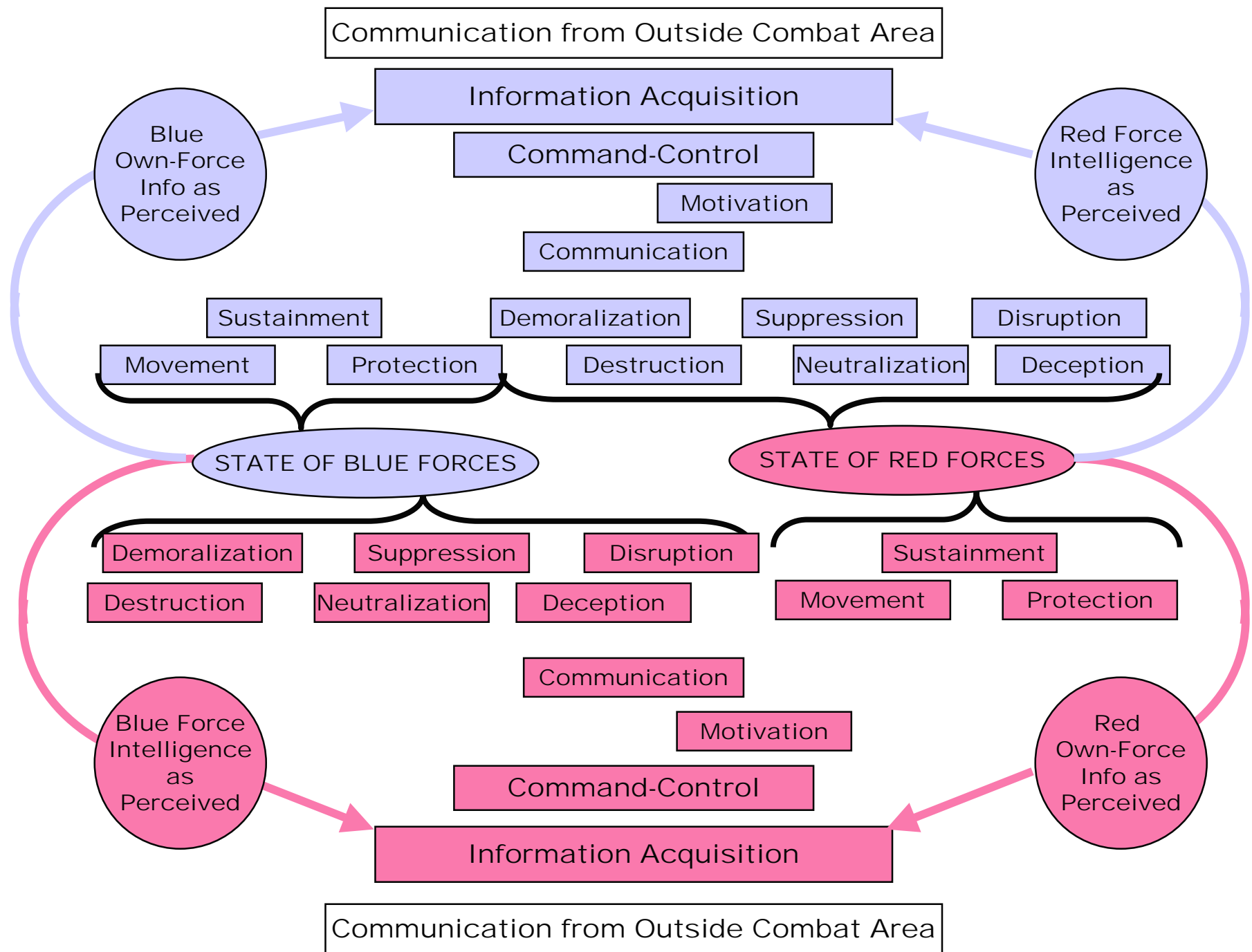
- **Introduction**
- **Identify Key Information Classes**
  - a.) **Warfighter's Perspective**
  - b.) **Platform Analyst's Perspective**
- **Locate Authoritative Data Sources (ADS)**
- **Establish Common Ways to Describe Data**
- **Establish Common Ways to Exchange Data**
- **Develop Tools and Utilities to Access, Exchange Data**
- **Establish Partnerships to Produce, Disseminate Data**
- **Address Key Technical, Process, and Policy Issues**



# **Key Information Classes Summary:**

- **The Warfighter's Perspective (missions, operations, tasks) is the Central Organizing Principle. The Systems, Platform, Equipment Perspective plays as supporting role defined by the Warfighter's Perspective.**
- **Key Information Classes include are subdivided into:**
  - **Entities, Processes, and Environment.**
- **Entity-focused information classes include:**
  - **Force Structure (order of battle: unit, electronic, logistics load-out, etc)**
  - **System C&P (to move, sense, communicate, engage, replenish)**
  - **Targets and Facilities (both static and mobile)**
  - **Weapons Effects (damage, attrition, suppression, etc.)**
- **Process-focused information classes include:**
  - **Doctrine and Tactics**
  - **C4ISR, Logistics**
  - **Human and Organizational Behavior**
- **Environment-focused information classes include:**
  - **Integrated Natural Environment (Terrain, Ocean, Air & Space)**
  - **Civil and Political Environment**

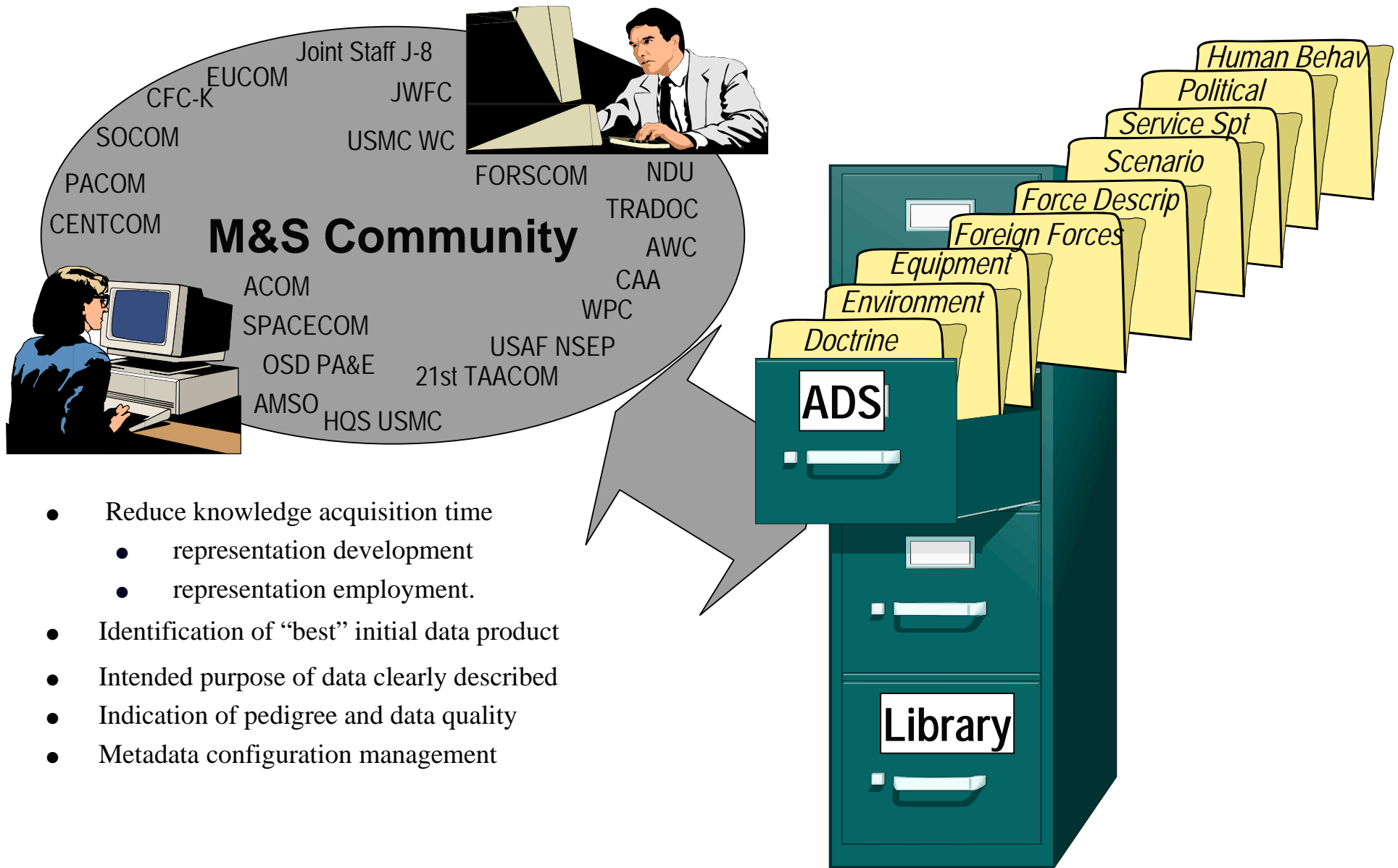




# **Data Provisioning**

- **Introduction**
- **Identify Key Information Classes**
  - a.) **Warfighter's Perspective**
  - b.) **Platform Analyst's Perspective**
- ● **Locate Authoritative Data Sources (ADS)**
- **Establish Common Ways to Describe Data**
- **Establish Common Ways to Exchange Data**
- **Develop Tools and Utilities to Access, Exchange Data**
- **Establish Partnerships to Produce, Disseminate Data**
- **Address Key Technical, Process, and Policy Issues**

# Identifying Source Data with ADS



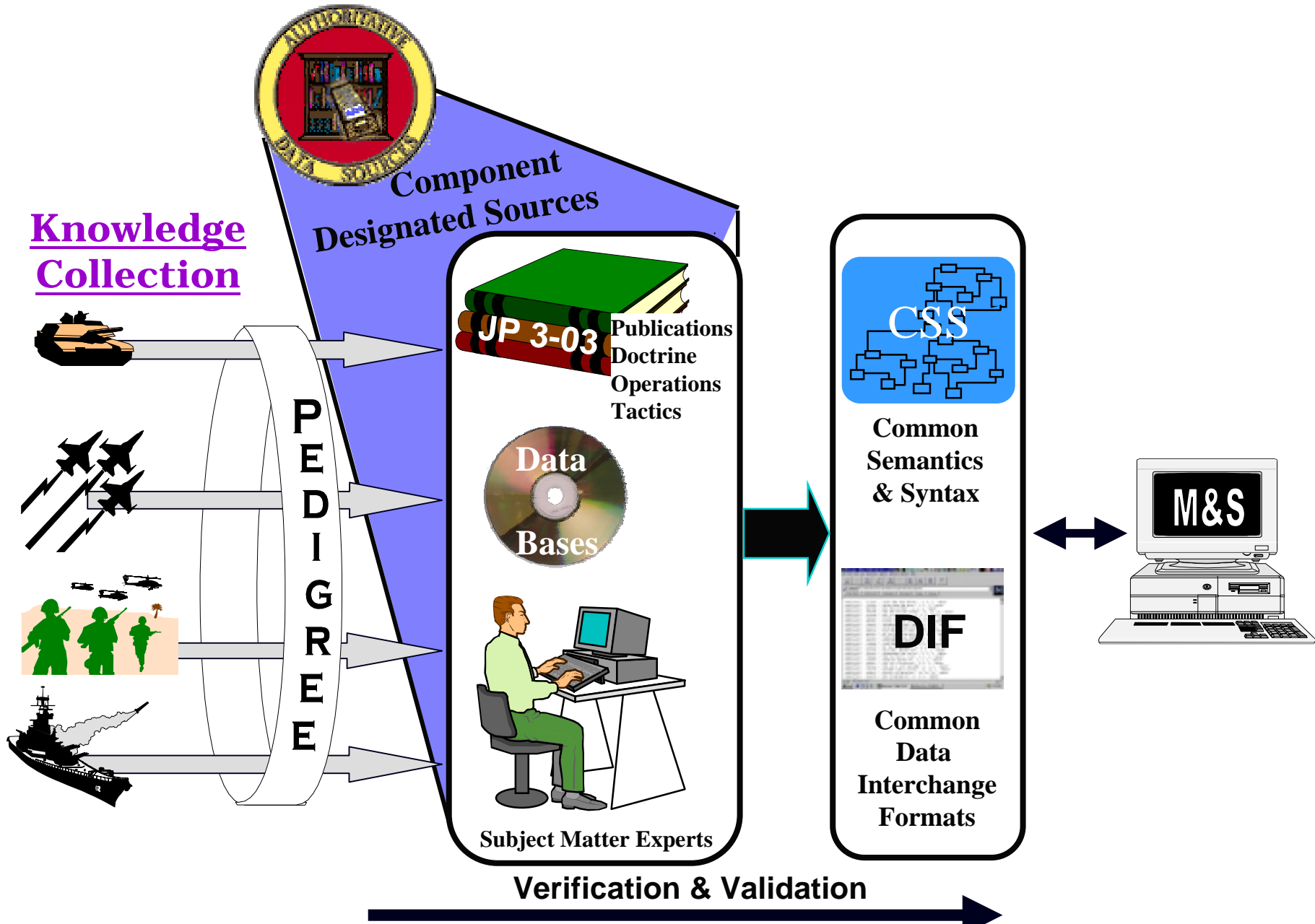
# **Authoritative Data Sources Summary:**

- A simulation is only as good as the data which drives it.
- If you need help figuring out where to begin, MSIAC is a good place to start.
  - Navigate to the DMSO home page – link to MSIAC home page.
- If you have a solid notion of what you need, but don't know where to find it, the ADS Working Group is a good way to get pointed to the best starter data:
  - Navigate to the DMSO home page – link to the appropriate ADS-WG member: AMSO, AF/XOCP, M&S Environmental EA's, etc.
  - Or navigate directly to the appropriate Service/Component ADS Library.
- If you are of an established data provisioning community:
  - Joint Data System for QDP,
  - Virtual Data Center for BMDO,
  - Joint Integrated Data Preparation Center for JFCOM

Then work through your designated representative to reach the above groups

- Human and Organizational Behavior
- If you still need help, contact one of the ADS Working Group co-chairs:
  - Mike Hopkins, DMSO ([mhopkins@dmsomil](mailto:mhopkins@dmsomil)) or
  - Lt Col Katherine Rowe, AF/XOCP ([roweka@af.pentagonmil](mailto:roweka@af.pentagonmil))

# Data Engineering Strategy



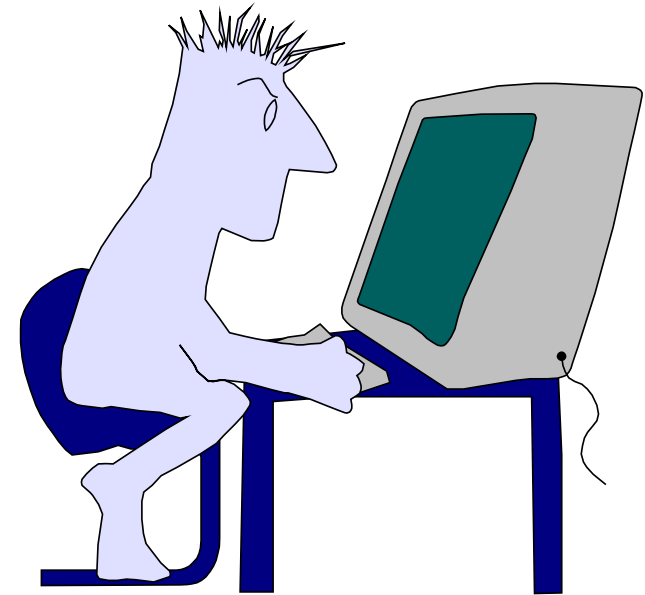
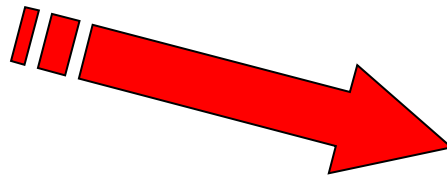
# Data Provisioning

- Introduction
- Identify Key Information Classes
  - a.) Warfighter's Perspective
  - b.) Platform Analyst's Perspective
- Locate Authoritative Data Sources (ADS)
- ● Establish Common Ways to Describe Data
- Establish Common Ways to Exchange Data
- Develop Tools and Utilities to Access, Exchange Data
- Establish Partnerships to Produce, Disseminate Data
- Address Key Technical, Process, and Policy Issues

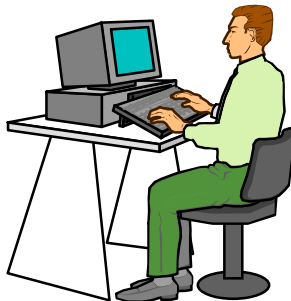
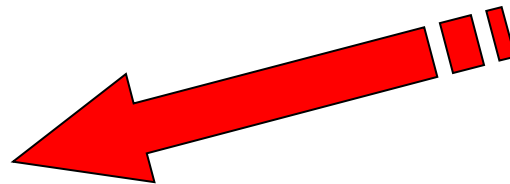
# Ambiguity is an Issue



FO calls in mission.  
FA Btty fires it.



Is he calling the priest to  
warn him that he's going to  
set the mission on fire?



But why is the church burning?

# **Common Semantics and Syntax**

## **SYNTAX:**

**the symbols and structures which may be used in a representation and the ways that those symbols may be arranged with the allowed structures.**

## **SEMANTICS:**

**the content or meaning embodied in the symbols and symbol arrangements defined in the syntax.**

## **COMMON SEMANTICS and SYNTAX:**

**the implementation-independent logical representation of structure and content (meaning) of a particular model or data element within the specified scope and context of a recognized standard.**

### **CSS is composed of:**

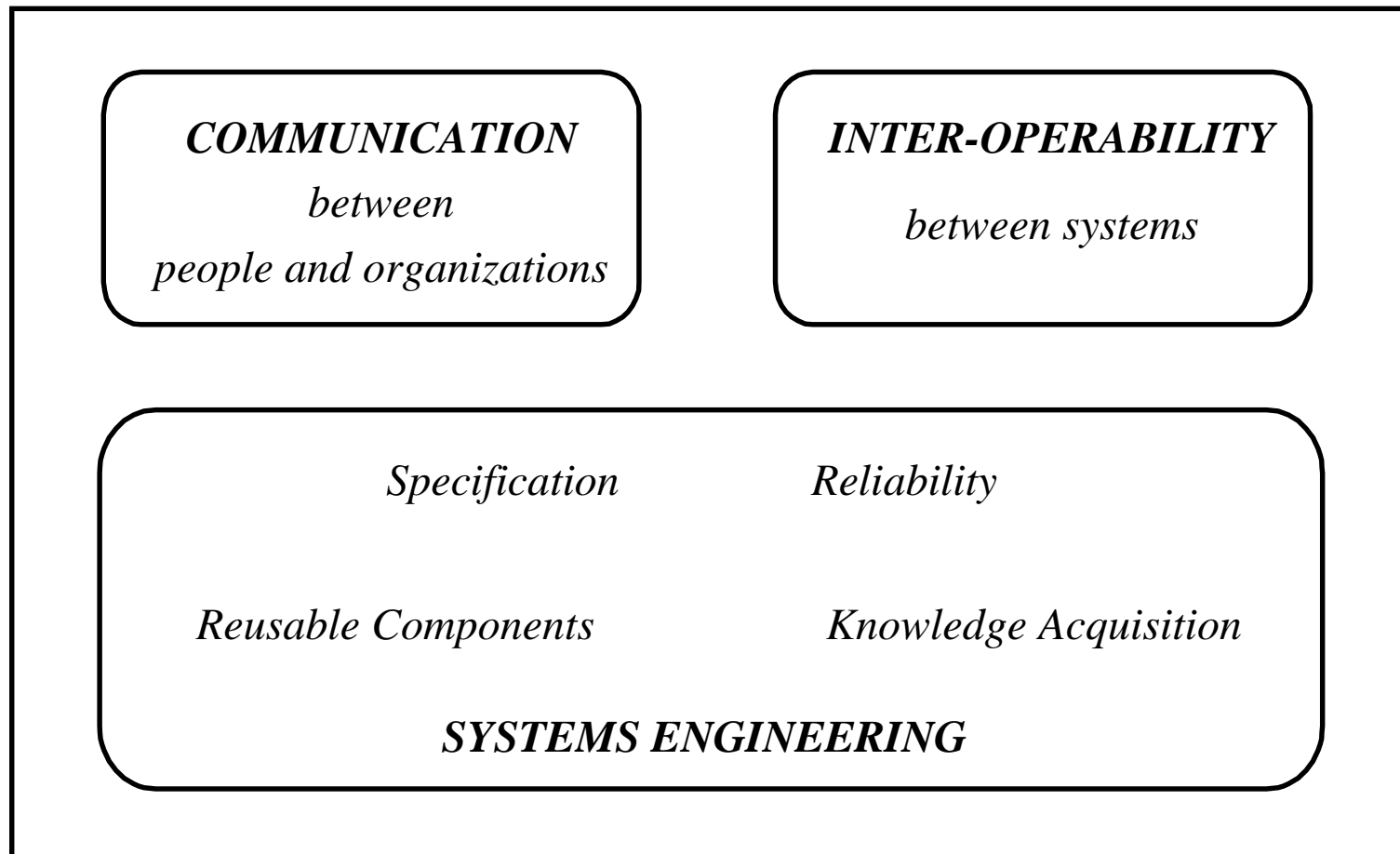
- **Common Lexicon**
- **Representation Templates**
- **Style Guide**

### **Examples:**

- **Entity, Task, Class names**
- **JSIMS FDP, C4ISR-AF ver 2.1**
- **UML guide for CMMS**

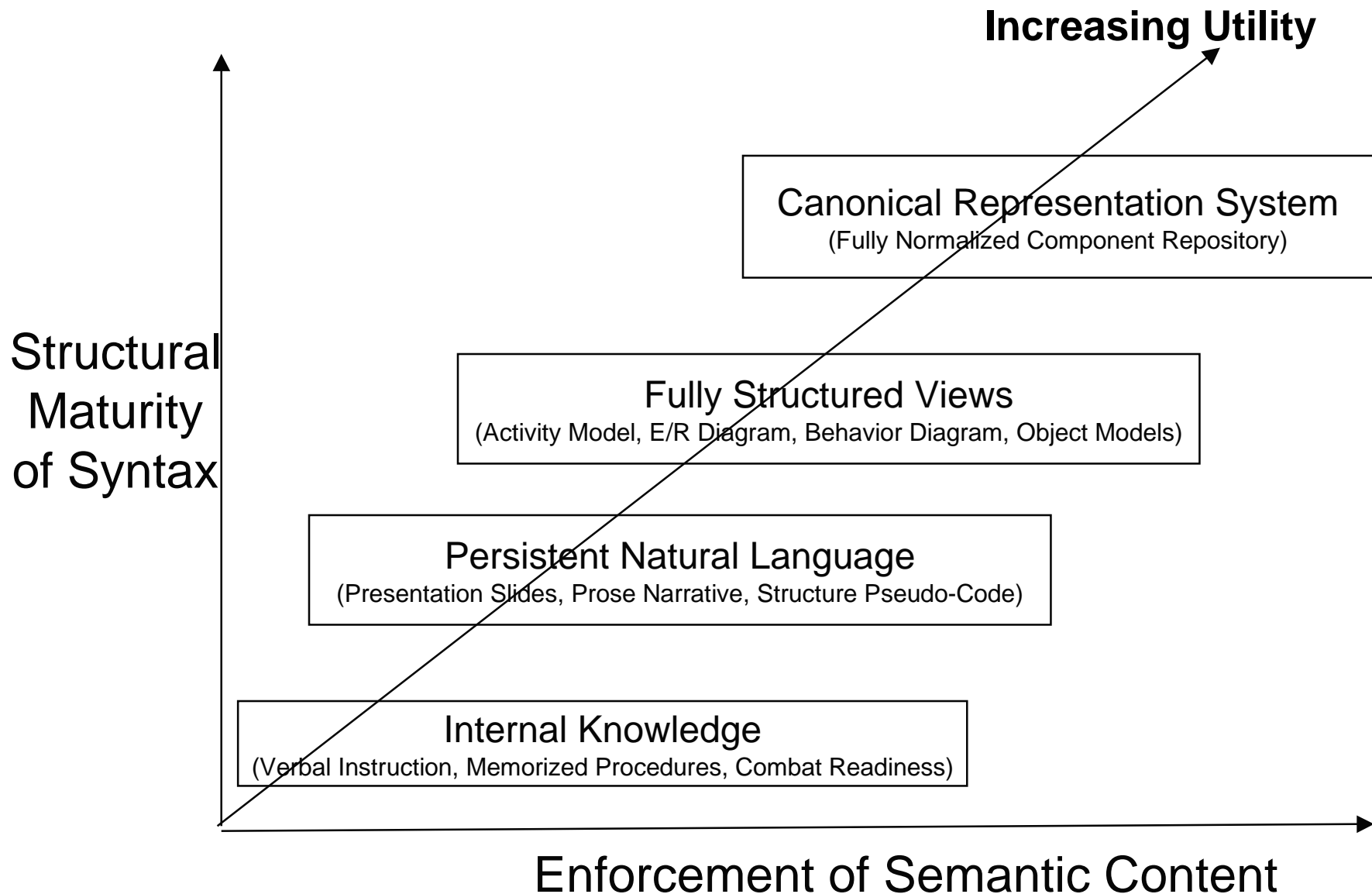


# Uses for Common Semantics & Syntax

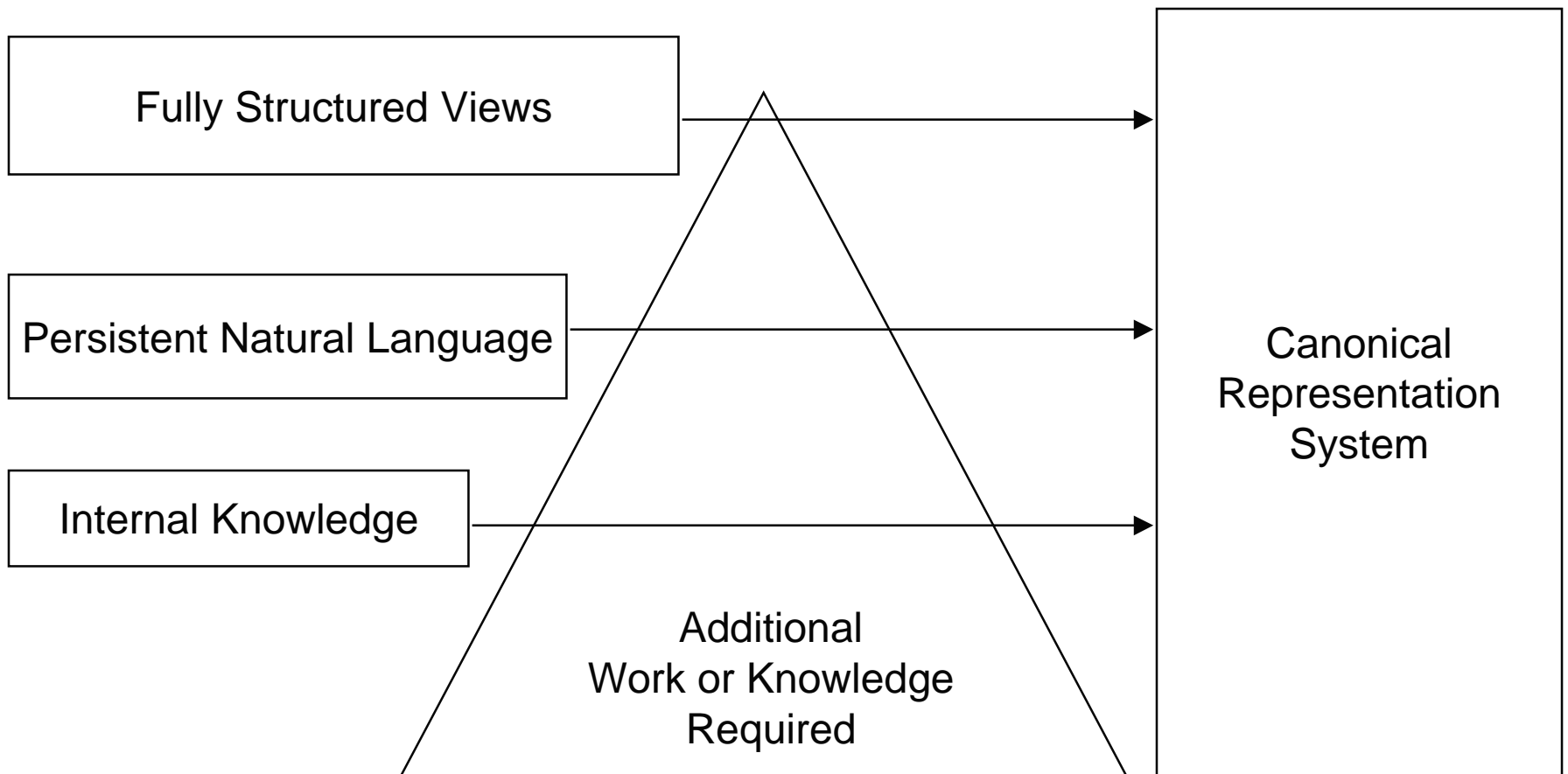


Adapted from Mike Uschold, 1996

# Representation Dimensions



## Migrating Knowledge at Multiple Levels of Structural Maturity



# **Data Provisioning**

- **Introduction**
- **Identify Key Information Classes**
  - a.) **Warfighter's Perspective**
  - b.) **Platform Analyst's Perspective**
- **Locate Authoritative Data Sources (ADS)**
- **Establish Common Ways to Describe Data**
- ● **Establish Common Ways to Exchange Data**
- **Develop Tools and Utilities to Access, Exchange Data**
- **Establish Partnerships to Produce, Disseminate Data**
- **Address Key Technical, Process, and Policy Issues**

# **Data Interchange Format**

## **FORMAT:**

**the set of symbols and structures which define the physical implementation of data (BNF, SQL, bits & bytes) conforming to a specified semantics and syntax.**

## **DATA INTERCHANGE FORMAT:**

**an intermediate format required to convert data from a set of input formats which share a common semantics and syntax to a set of output formats without loss or distortion of content.**

## **DATA INTERCHANGE MECHANISM:**

**a set of tools, utilities, or application programming interfaces which perform the conversion into and/or out of a data interchange format**

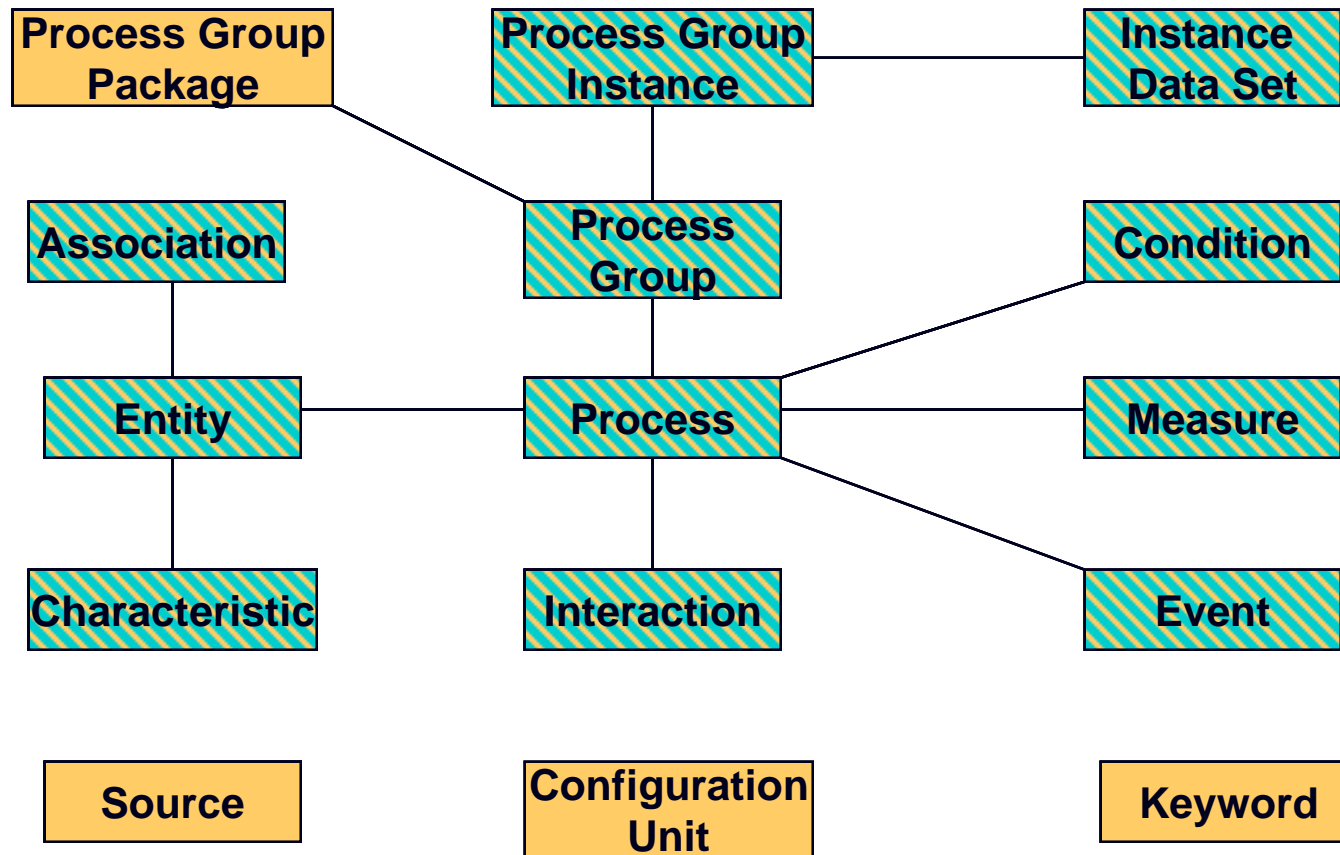
## **DIF is composed of:**

- **a CS&S**
- **a physical format**

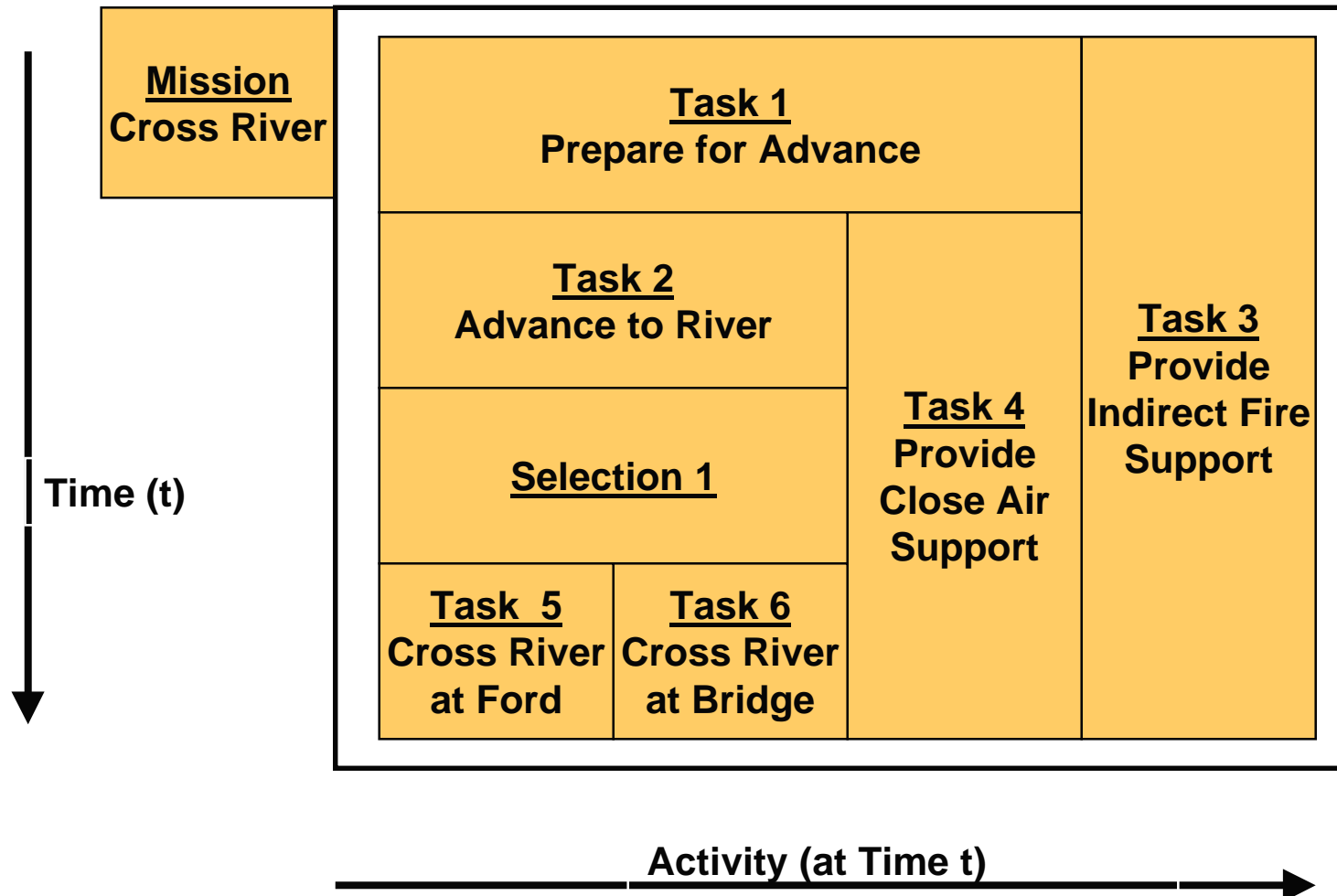
## **Examples:**

- **HLA-OMT, SEDRIS Data Representation**
- **HLA-OMT-DIF, SEDRIS Transmittal, UOB-DIF, CMMS-DIF**

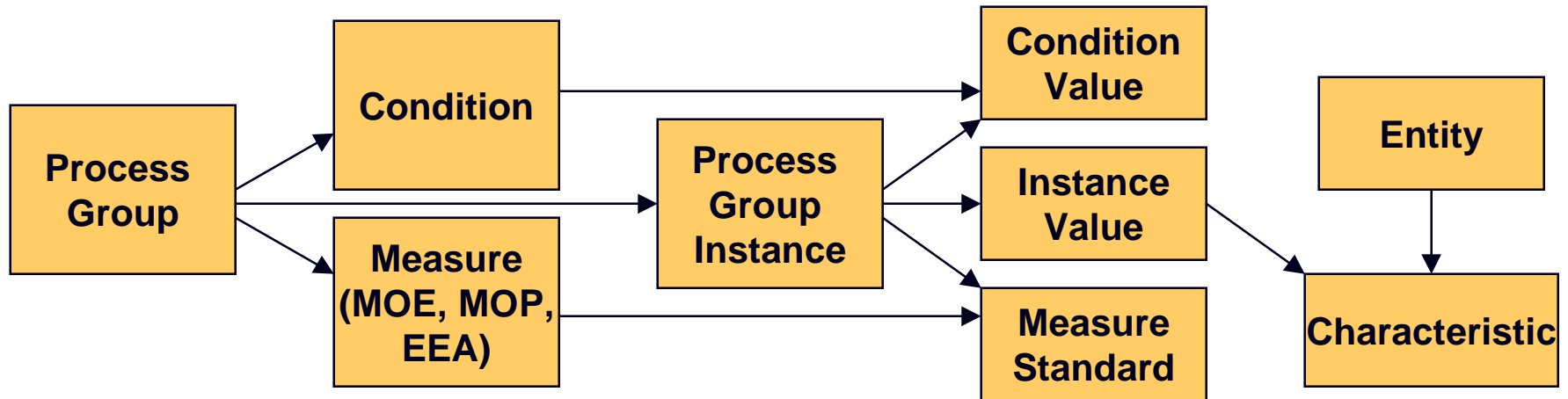
# CMMS Data Interchange Format



# The Operational View



# An Engineering Requirements View





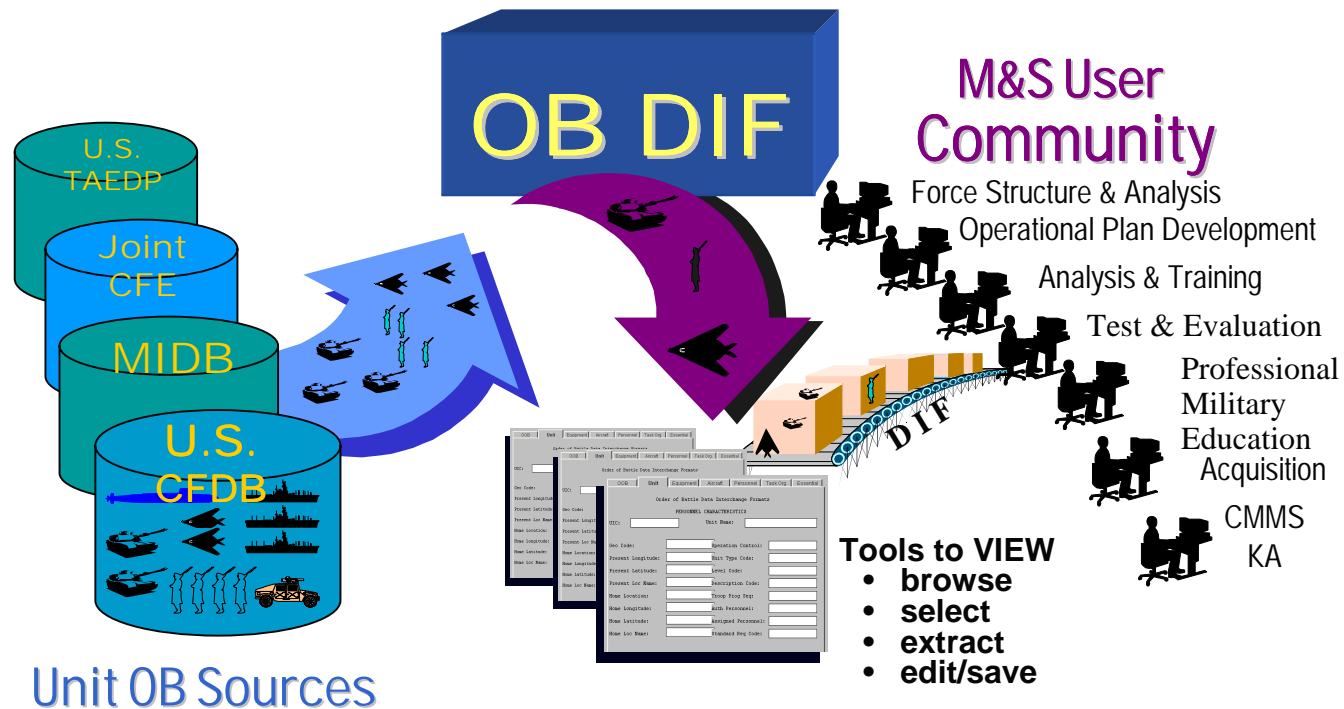
# **Data Standards Summary:**

- **Enforce the Standard between major applications; encourage PM's to make pragmatic choices about where and when to embrace the Standard inside the application.**
- **If you need help with Data Standards, contact the:**
  - **Appropriate Service Standards Category Coordinator (Army in the lead, Navy and AF making excellent strides) via their respective M&S management offices.**
  - **The M&S Executive Agents for Intell and Environment (Terrain, Ocean, Air & Space) via DMSO.**
  - **The M&S Functional Data Administrator (Bob Senko, DMSO, [rsenko@dmso.mil](mailto:rsenko@dmso.mil))**

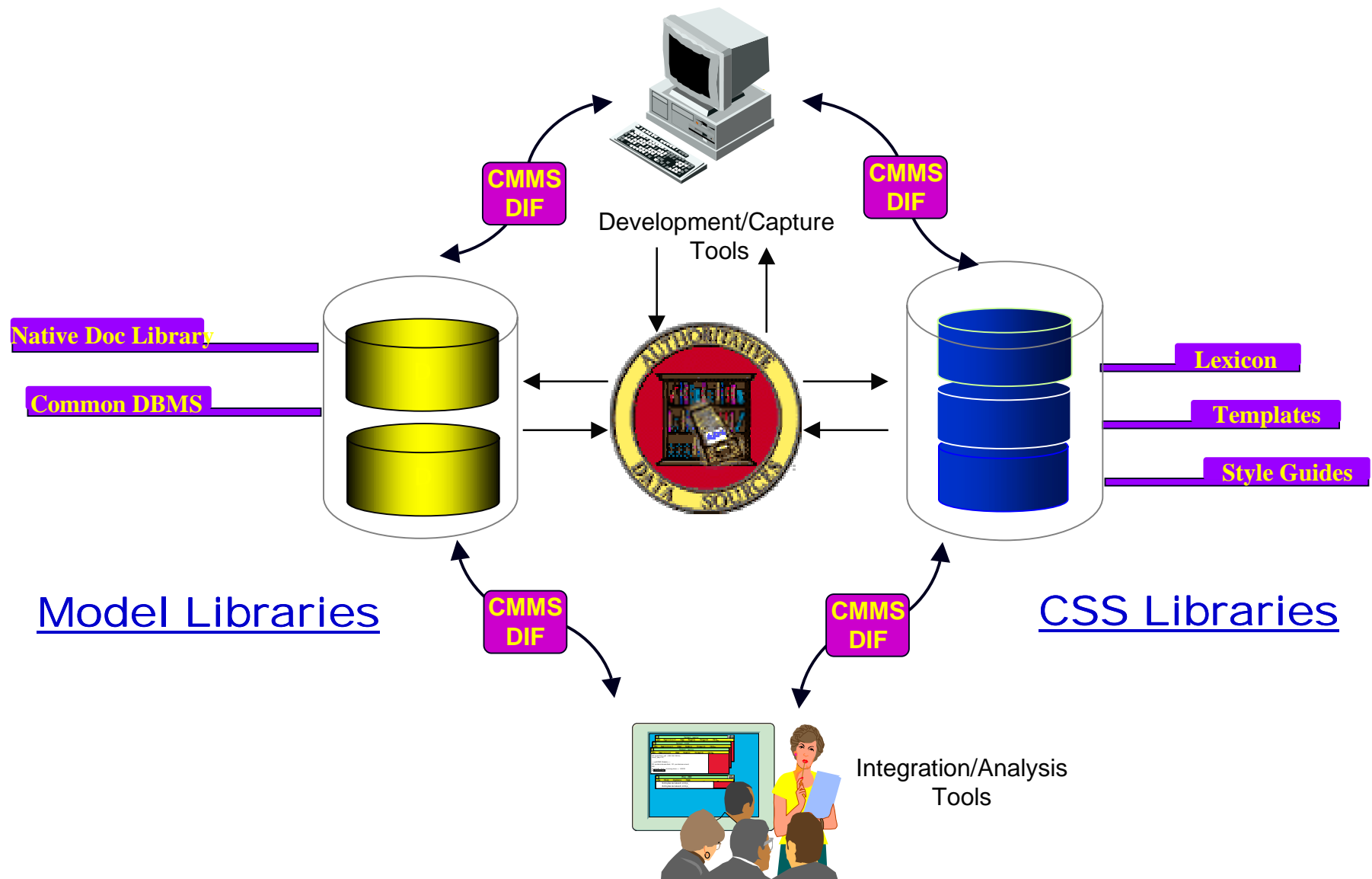
# **Data Provisioning**

- **Introduction**
- **Identify Key Information Classes**
  - a.) **Warfighter's Perspective**
  - b.) **Platform Analyst's Perspective**
- **Locate Authoritative Data Sources (ADS)**
- **Establish Common Ways to Describe Data**
- **Establish Common Ways to Exchange Data**
- ● **Develop Tools and Utilities to Access, Exchange Data**
- **Establish Partnerships to Produce, Disseminate Data**
- **Address Key Technical, Process, and Policy Issues**

# Unit Order of Battle (UOB) Data Access Tool (DAT)

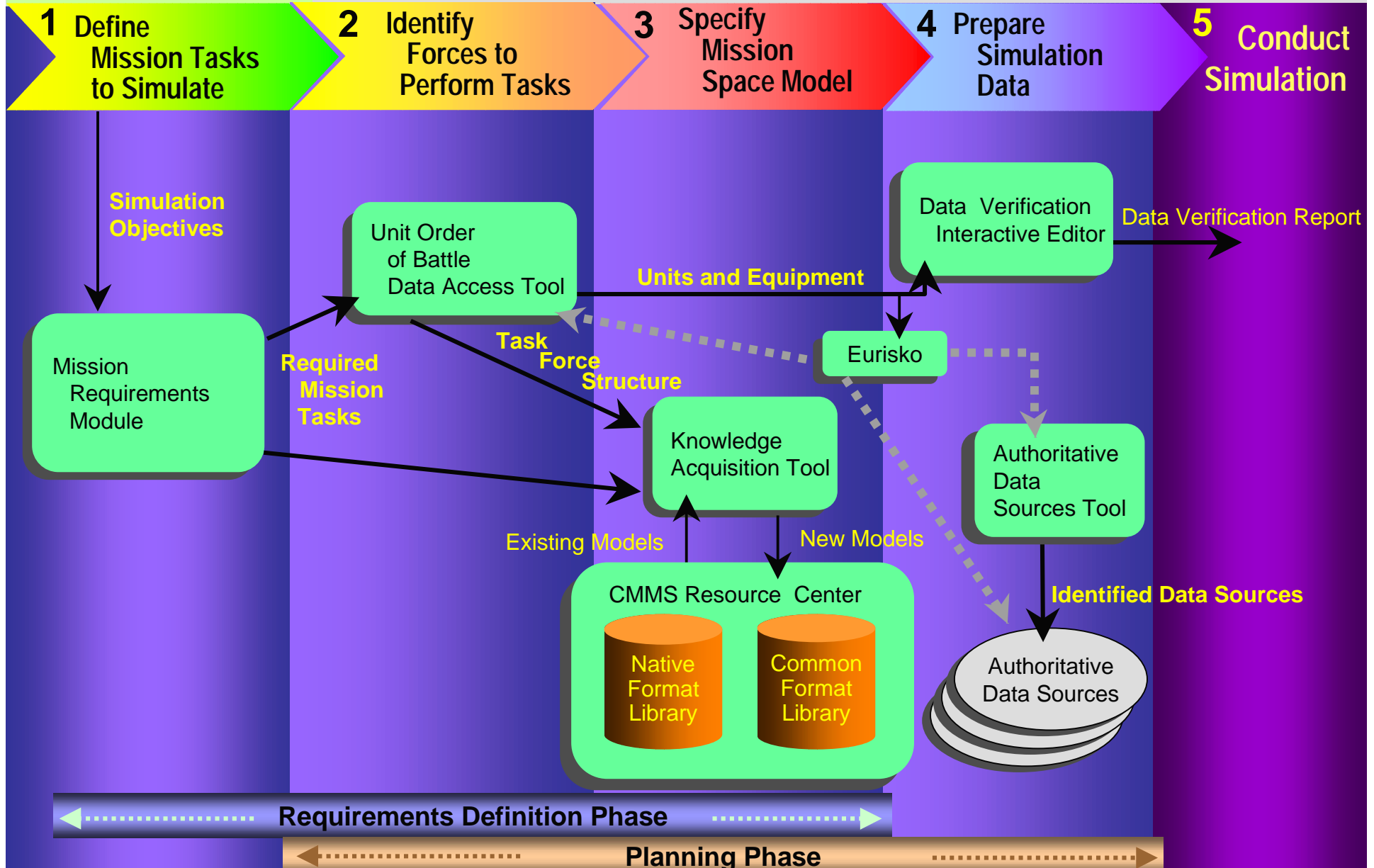


# CMMS Toolset Architecture





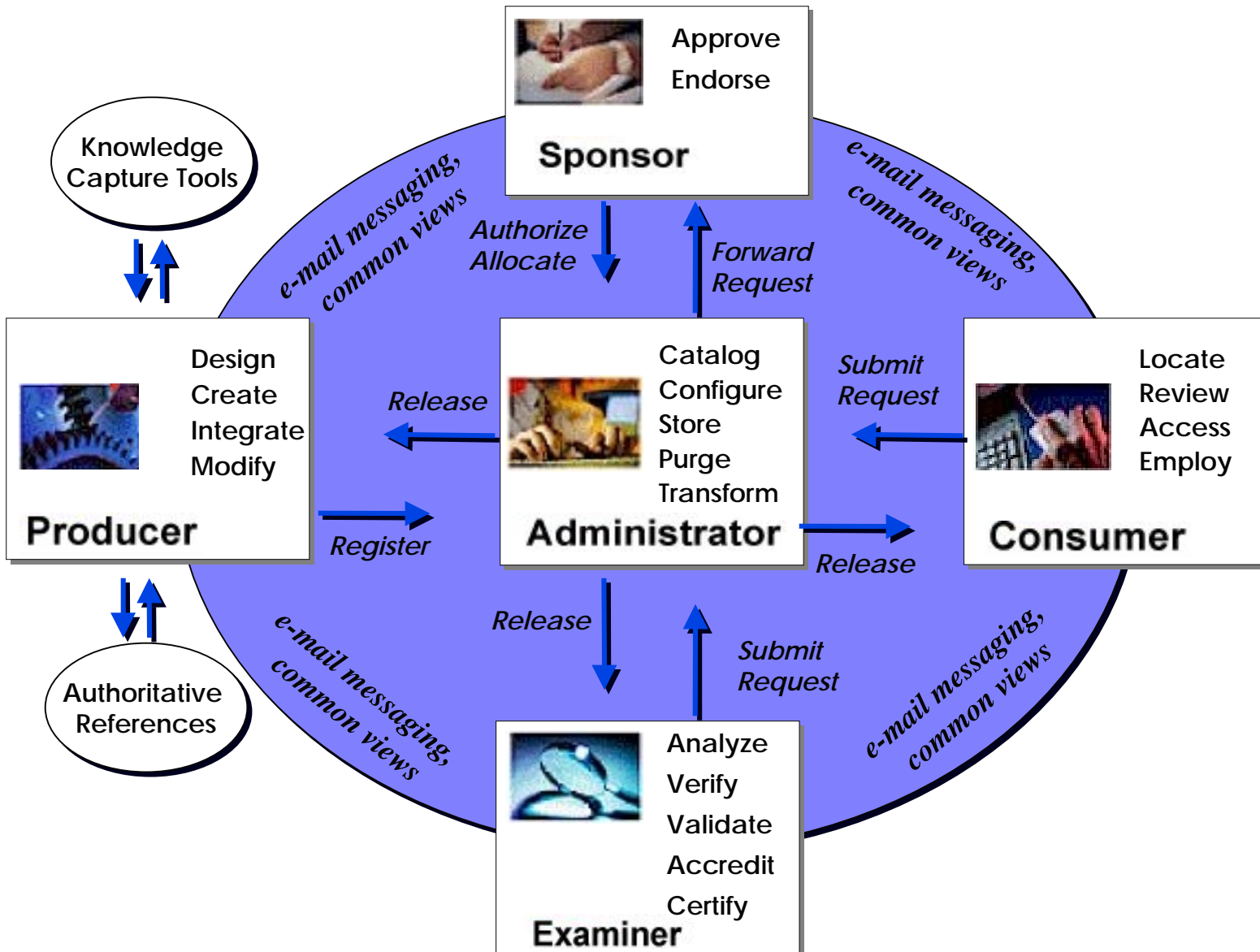
# Demonstration Thread



# **Data Provisioning**

- **Introduction**
- **Identify Key Information Classes**
  - a.) **Warfighter's Perspective**
  - b.) **Platform Analyst's Perspective**
- **Locate Authoritative Data Sources (ADS)**
- **Establish Common Ways to Describe Data**
- **Establish Common Ways to Exchange Data**
- **Develop Tools and Utilities to Access, Exchange Data**
- ● **Establish Partnerships to Produce, Disseminate Data**
- **Address Key Technical, Process, and Policy Issues**

# Data Engineering Process



# Key Concepts

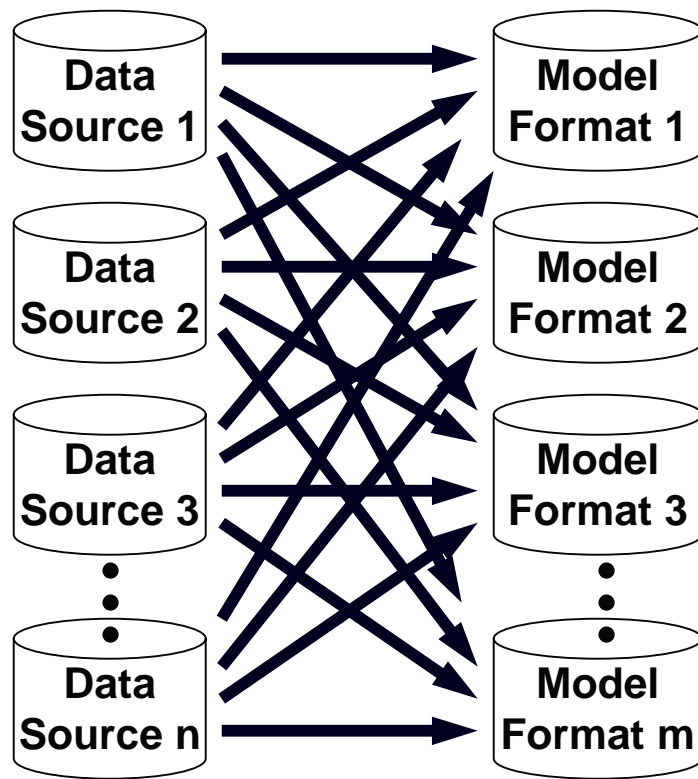
- **It's Content that Counts**
  - **Enforcing and administering access control drives everything else**
- **Formal Collaborations**
  - **Partners: shared funding, shared decision making**
  - **Associates: shared products**
  - **Observers: shared discussion**
- **Focus on Content Exchange**
  - **Common semantics for logical structure and meaning**
  - **Neutral formats for data exchange**
- **Use before Re-use**
  - **“Fill it and they will come...”**
  - **“Add value for the original requirement and they will stay...”**
  - **“Focus on the food label, not the diet”**
  - **“Do the hardest one early, the easy ones will follow”**



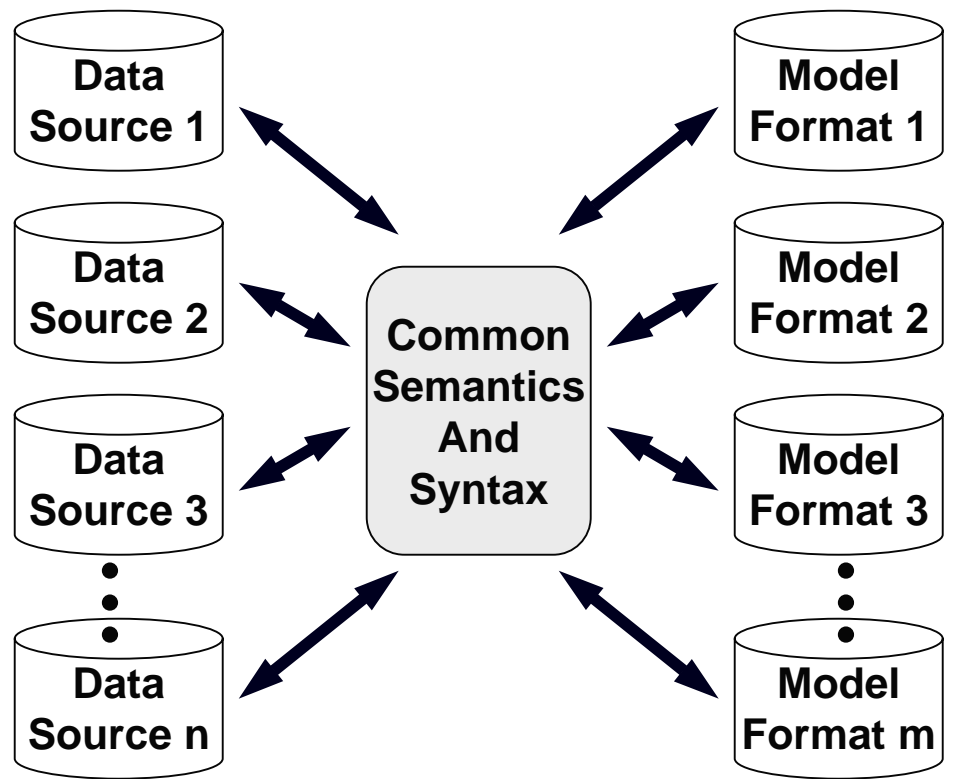
# **Data Provisioning**

- **Introduction**
- **Identify Key Information Classes**
  - a.) **Warfighter's Perspective**
  - b.) **Platform Analyst's Perspective**
- **Locate Authoritative Data Sources (ADS)**
- **Establish Common Ways to Describe Data**
- **Establish Common Ways to Exchange Data**
- **Develop Tools and Utilities to Access, Exchange Data**
- **Establish Partnerships to Produce, Disseminate Data**
- ● **Address Key Technical, Process, and Policy Issues**





**Current State**



**Desired State**

